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Computerized CBT (Think, Feel, Do) for Depression and Anxiety in Children and Adolescents: Outcomes and Feedback from a Pilot Randomized Controlled Trial

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Background: Research has demonstrated the effectiveness of computerized cognitive behaviour therapy (cCBT) for depression and anxiety in adults, but there has been little work with children and adolescents. **Aims:** To describe the development of a cCBT intervention (Think, Feel, Do) for young people, and preliminary outcomes and feedback from a pilot randomized controlled trial. **Method:** Twenty participants aged 11 to 16 with depression or anxiety were randomized to receive cCBT immediately or after a delay. Standardized measures were used to assess self-reported anxiety, depression, self-esteem and cognitions, as well as parent rated strengths and difficulties. A feedback form was also completed to assess young people's views of the programme. **Results:** A total of 15 participants completed the pre and post assessments in the trial, and 17 provided feedback on the intervention. Paired samples *t*-tests demonstrated significant improvements on 3 subscales in the control condition, compared to 7 subscales in the cCBT condition. Feedback showed moderate to high satisfaction for participants. **Conclusions:** This study provides encouraging preliminary results for the effectiveness and acceptability of cCBT with this age group.

Keywords: Children, adolescents, CBT, computer, depression, anxiety.

Introduction

Depression and anxiety are common in children and adolescents (Costello, Mustillo, Erkanli, Keller and Angold, 2003; Ford, Goodman and Meltzer, 2003). Cognitive behaviour therapy (CBT) has been found to be an effective intervention for such problems (Klein, Jacobs and Reinecke, 2007; Cartwright-Hatton, Roberts, Chitsabesan, Fothergill and Harrington, 2004; Ishikawa, Okajima, Matsuoka and Sakano, 2007), and as such CBT is now recommended by the UK National Institute of Clinical Excellence for the treatment of depression, obsessive compulsive disorder and posttraumatic stress disorder in children and adolescents (NICE, 2005a, b, c). However there is a lack of CBT specialism in Child and Adolescent Mental Health Services (CAMHS) (Stallard, Udwin, Goddard and Hibbert, 2007). Thus, in recent years, work has begun to focus on ways of increasing access to CBT, such as through the use of computers.

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In adults, a number of studies (Bergstrom *et al.*, 2008; Craske *et al.*, 2009; Kessler *et al.*, 2009; Learmonth, Trosh, Rai, Sewell and Cavanagh, 2008; Titov, Andrews, Schwencke, Drobny and Einstein, 2008; Warmerdam, van Straten, Jongasma, Twisk and Cuijpers, 2010; Whitfield, Hinshelwood, Pashely, Campsie and Williams, 2006) and reviews and meta analyses (Barak, Hen, Boniel-Nissim and Shapira, 2008; Cuijpers *et al.*, 2009; Reger and Gahm, 2009; Spek *et al.*, 2007) have demonstrated the effectiveness of computerized CBT (cCBT) for depression and anxiety disorders. Such work has demonstrated a number of benefits of cCBT, such as increased availability (Griffiths and Christensen, 2007), and the ability to use cCBT in your own home (Beattie, Shaw, Kaur and Kessler, 2009; Graham, Franses, Kenwright and Marks, 2000). Computerized CBT is now recommended by NICE for depression and anxiety in adults (NICE, 2008), and dissemination into the UK National Health Service is underway.

There is, however, less work on the effectiveness of cCBT for depression and anxiety in children and adolescents (see Richardson, Stallard and Velleman, 2010, for a review). The software package, "BRAVE Online", has been shown to be effective for the treatment of anxiety disorders in those aged 7 to 14 years (Spence, Holmes, March and Lipp, 2006; March, Spence and Donovan, 2009), whilst case studies of "Cool Teens" for anxiety disorders in adolescents have been encouraging (Cunningham *et al.*, 2009). A case series on the intervention "Stressbusters" showed reductions in depression diagnoses in adolescents aged 12 to 16 years (Abeles *et al.*, 2009), whilst other work has shown positive results for those with sub-clinical depression (Gerrits, Van Der Zanden, Visscher and Onijn, 2007; Van Voorhees *et al.*, 2009).

There is thus a relatively limited literature on cCBT for children and adolescents, and in particular there are few software packages that have been developed specifically for this age group. The aim of this study is to describe the development of a software package (Think, Feel, Do) for depression and anxiety in children and adolescents, and report preliminary results on feedback and outcomes from a pilot randomized controlled trial.

Method

Participants

Ethical approval was obtained from the local National Health Service ethics committee. Participants were recruited from Tier 3 CAMHS. Inclusion criteria were: aged 11 to 16 years and presenting with a primary problem of an anxiety disorder (generalized anxiety disorder, specific phobia, social phobia or panic disorder) or mild/moderate depression. Participants were excluded if English was not their first language and if they had severe depression or serious self-harm or psychosis. Those who had recently been the victims of abuse or had significant co-morbidities such as PTSD, autism, ADHD or learning difficulties were also excluded.

Referrals to Tier 3 CAMHS were offered an initial appointment with a member of the multidisciplinary team to assess the extent and nature of their problems and whether specialist intervention from the team was indicated. If an intervention was required, the assessing clinician decided upon the most suitable approach, *e.g.* family therapy or CBT, and the child was placed on a waiting list for their designated therapy. Those who were assessed as suitable for specialist CBT were invited to take part in the study whilst waiting to see a CBT therapist.

Design

A pilot randomized controlled trial was conducted initially comparing computerized CBT (Think, Feel, Do) to a waiting list control. However, after the first two referrals the design was changed to increase uptake so that participants were randomized to receive either immediate or delayed cCBT. Baseline assessments were completed before randomization. Those in the TFD group then had the 6 sessions and then a follow-up assessment, whilst those in the control group waited for approximately 4 weeks before completing the follow-up assessments and beginning the TFD sessions.

Measures

At baseline and follow-up assessments parents/carers completed the Strengths and Difficulties Questionnaire (SDQ) Parent Version (Goodman, 1997). This consists of 25 items rated on a 3-point scale. The items are summed to produce 5 subscales (Emotional symptoms; Conduct problems; Hyperactivity/inattention; Peer relationship problems; Prosocial behaviour). There is also a score to measure the impact of these problems. This measure is designed for use with those aged 4 to 16 years, with different norms being provided for different age groups. The measure has been shown to have good psychometric properties with high reliability (Goodman, 2001).

Children completed the Spence Children's Anxiety Scale (SCAS) Child Version (Spence, 1998). This is a self-report measure of 44 items each rated on a 4-point scale of frequency. The items are summed to produce the 6 subscales of Separation anxiety, Panic/agoraphobia, Social phobia, Obsessive compulsive disorder, Generalized anxiety, and Physical injury fears. Norms are provided for boys and girls separately from ages 8 to 15, but the measure has often been used with adolescents up to the age of 18 (Muris, Merckelbach, Schmidt, Gadet and Bogie, 2001). This measure has been shown to have good psychometric properties (Spence, Barrett and Turner, 2003).

The Adolescent Well Being Scale (AWS; Birleson, 1980) is a self-report measure of depressive symptoms for those aged 11 to 16 years. There are a total of 18 items that are summed to make a total score. A total score of 13 or above indicates possible depression.

The Rosenberg Self-Esteem Inventory (RSEI; Rosenberg, 1965) is a self-report measure of global self-esteem consisting of 10 items rated on a 4-point scale of agreement. Items are summed to make a total score, with a score below 15 indicating low self-esteem.

The Schema Questionnaire for Children (SCQ) (Stallard and Rayner, 2005) is a self-report measure of schemas/thinking patterns that consists of 15 items such as "No one understands me" which are responded to on a scale of 1 (Don't really believe at all) to 10 (Very strongly believe). The items are summed to produce an overall score.

Procedure

Participants were assessed for suitability during their initial appointment at CAMHS. If they met study inclusion criteria they were given an information sheet with an opt-in reply slip to return to the researchers. Participants who completed the opt-in form were then contacted and a visit to their home was arranged. Participants were given further information, shown a short video of TFD, and encouraged to ask any questions. For those who wanted to take part

both parent and child completed a consent form. The standardized measures were then used to conduct a baseline assessment. Randomization was conducted by another member of the research team using blank envelopes. The 6 cCBT sessions were then delivered immediately for those in the experimental group, or after a few weeks in the control group. For those in the TFD group, a post assessment was completed after the sessions were finished, comprising the standardized measures and a short feedback questionnaire. The post intervention assessor was always different from the psychology assistant who delivered the intervention. The TFD sessions were delivered in the participants' homes at a time of their choice. For one participant, sessions were delivered in school. Sessions were usually weekly but sometimes had to be more frequent so as to be completed before CAMHS appointments began.

Data analysis

Missing data were minimal. Out of a total of 3630 assessment items, 16 were not completed by participants. When this occurred the mode value for all study participants for that specific item was calculated and was entered by the researcher. Subscale scores were then calculated as normal. One-tailed paired samples *t*-tests were used to compare pre and post scores within the TFD and control group separately.

The intervention – Think, Feel, Do (TFD)

“Think, Feel, Do” is a 6-session CD-ROM based on the CBT workbook *Think Good – Feel Good* (Stallard, 2004). Each session lasts approximately 30–45 minutes, and the programme is designed to be facilitated by a professional such as a psychology assistant, teacher or nurse. There is a plentiful supply of psychology assistants and this offers a potentially low cost way in which CBT skills and ideas can be made more accessible.

The TFD facilitator is not a CBT therapist and only minimal CBT expertise and training is required to guide the young person through the programme. The facilitator's role is to discuss and elaborate on the programme content, as well as to provide support and clarify misunderstandings. The facilitator also helps the young person reflect on the material presented and apply the lessons learnt to their own experiences. The facilitator is present throughout the delivery of the programme.

“Think Feel Do” was developed with the help of young people and four focus groups that were used to inform the graphics, music and cartoons. Young people also spoke the voice-overs and acted in the video clips used in the programme. TFD is interactive with responses to quizzes and exercises being entered directly into the programme. It is also multimedia with sounds, photos, cartoons and music, and uses narrators to guide the user through the sessions. Responses are saved so that previous work can be reviewed. At the end of each session, participants are given a brief assignment to complete. Table 1 gives an overview of the topics covered in each of the six sessions. Figures 1 and 2 provide examples of the graphics and content of TFD.

Results

Participant flow and characteristics

A total of 39 individuals were identified by CAMHS clinicians as suitable for the trial and were provided with information. Figure 3 shows the flow of participants through the trial.

Table 1. Topics covered in each session

Session	Overview	Specific areas covered	Homework assignment
1	Introduction	Introduction, psycho-education, assessment positive diary, link between thoughts, feelings and behaviour	Find two positive things that happen
2	Emotional recognition	Emotional recognition, identifying body signals, link between thoughts and feelings, examine how feelings change in different situations	Identify one situation that made you feel good and one that made you feel bad
3	Thoughts	Link between thoughts and feelings, identifying positive and negative thoughts, understand there are different ways of thinking	Identify one thought that makes you feel good and one that makes you feel bad
4	Thinking positively	Identify thinking traps such as negative glasses and blowing things up, learn how to change negative thoughts to positive thoughts	Identify two negative thoughts and change them into more helpful ones
5	Emotional management	Learn about and experiment with different techniques to control unpleasant emotions and feelings e.g. deep breathing, mind games, special place etc.	Try some of these ideas and see what works for you
6	Problem solving	Learn about different approaches to problem solving, such as Stop, Plan, Go. Summary and review progress	-

Twenty individuals provided consent and were randomized with 10 in each condition. In the control group, one individual did not complete the post assessment as they had begun appointments at CAMHS. In the TFD condition, four individuals did not complete all sessions and the post-assessments. Two of these had begun CAMHS appointments, one had a family emergency, and one could not be contacted to begin sessions.

Those completing the trial in the TFD condition were aged 11 to 14, with a median age of 12 years; 4 were male and 2 were female. Completers in the control condition were slightly older, ranging in age from 11 to 17, with a median of 15 years, but with a similar gender distribution; 6 were male and 3 were female. In the TFD condition, four presented with anxiety, one with depression, and one with OCD. In the control condition six presented with depression and three presented with anxiety.

Outcomes

One-tailed paired samples *t*-tests were used to examine any changes within the TFD and control condition separately. Table 2 demonstrates the significant changes. All significant differences represent an improvement in scores. As Table 2 demonstrates, there were significant improvements on seven subscales in the TFD group, compared with three in the control group.

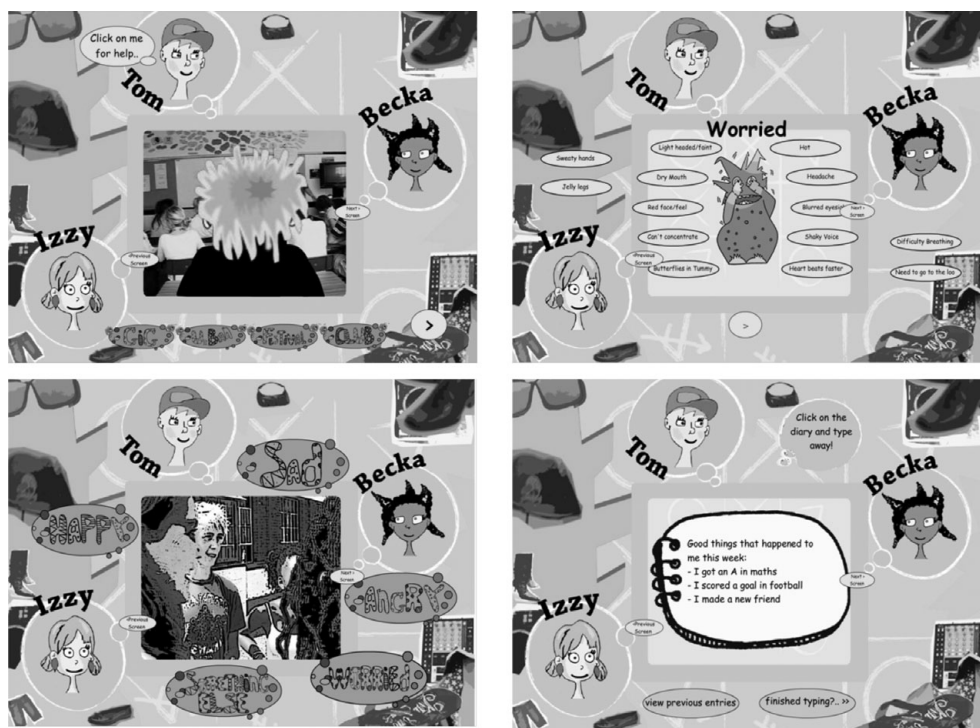


Figure 1. Examples of TFD content. From top left clockwise: Character placement in a situation video, Identifying body signals, Recording good things that have happened, Identifying emotions in different situations.

Feedback

A total of 17 participants completed all 6 sessions of TFD and completed a feedback questionnaire. Table 3 shows the median rating for each item, with average scores being medium to high for all items.

Discussion

This small pilot study examined the use of a novel cCBT intervention for children and adolescents with depression and anxiety. Uptake was lower than expected, in line with previous work demonstrating scepticism from young people about cCBT (Stallard, Velleman and Richardson, 2010). However, once children agreed to participate they appeared to engage fully with the programme. Although some individuals in the cCBT condition did not complete the intervention, none of these participants dropped out because of dissatisfaction with the intervention. This is important as drop-out is often high with computerized CBT (Waller and Gilbody, 2009).

The sample size here is very small and the results need to be treated with appropriate caution. Nonetheless, these preliminary findings are encouraging and indicate that cCBT

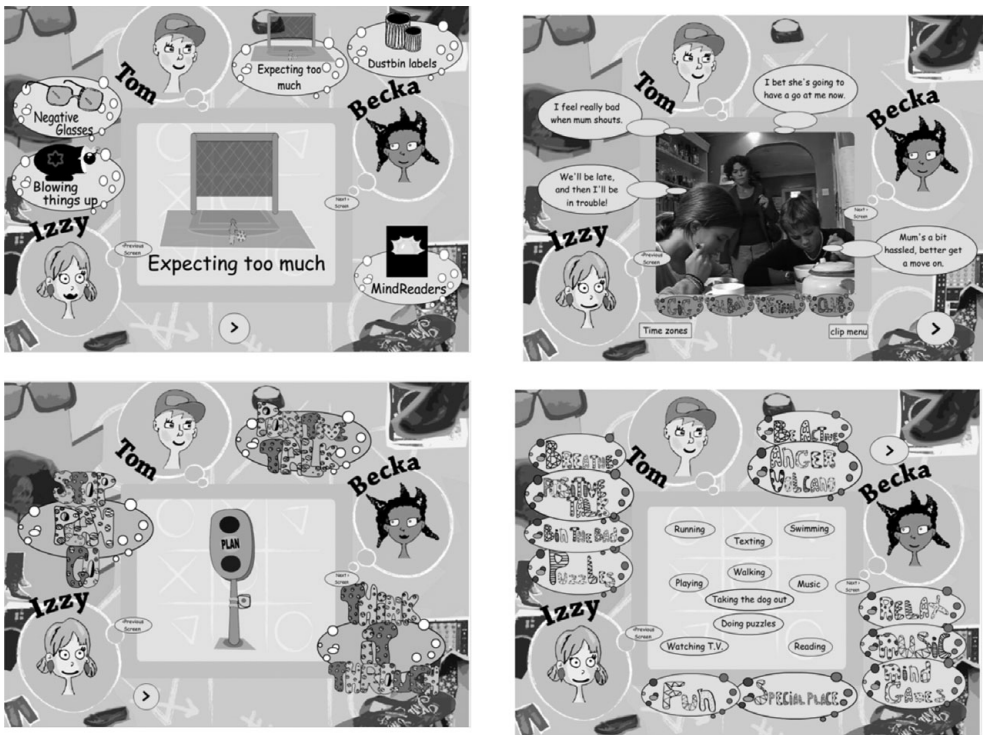


Figure 2. Examples of TFD content. From top left clockwise: Identifying thinking traps, Identifying thoughts in a situation video, Looking at ways to stay calm, Examining problem solving techniques.

resulted in significant post treatment improvements on more measures than the waiting list control group. These results tentatively suggest that child mental health can be improved through the provision of a supported cCBT intervention whilst on a waiting list for specialist face to face CBT. This is in line with previous work that has found improvements in cognitions, self-esteem and depressive and anxiety symptoms in children and adolescents after cCBT (Abeles et al., 2009; March et al., 2009; O’Kearney, Gibson, Christensen and Griffiths, 2006; Spence et al., 2006). Exactly why the reductions for self-reported anxiety were less pronounced than those for depression and secondary outcomes such as self-esteem is unclear. Previous meta-analyses have suggested that cCBT is more effective for anxiety than depression in adults (Barak et al., 2008; Spek et al., 2007), and this may become more apparent with a larger sample.

There were no changes in the control group in terms of parent rated mental health, yet there were improvements on subscales of emotional symptoms, hyperactivity and total difficulties for the cCBT group. Thus the cCBT intervention seemed to make visible changes to the child’s emotional symptoms and behaviour in the family environment.

Quantitative feedback from the children and adolescents suggested moderate to high satisfaction with TFD. Ratings suggest that participants found TFD enjoyable, and that it had helped them understand their problems and to find new ways to cope with them. Similarly,

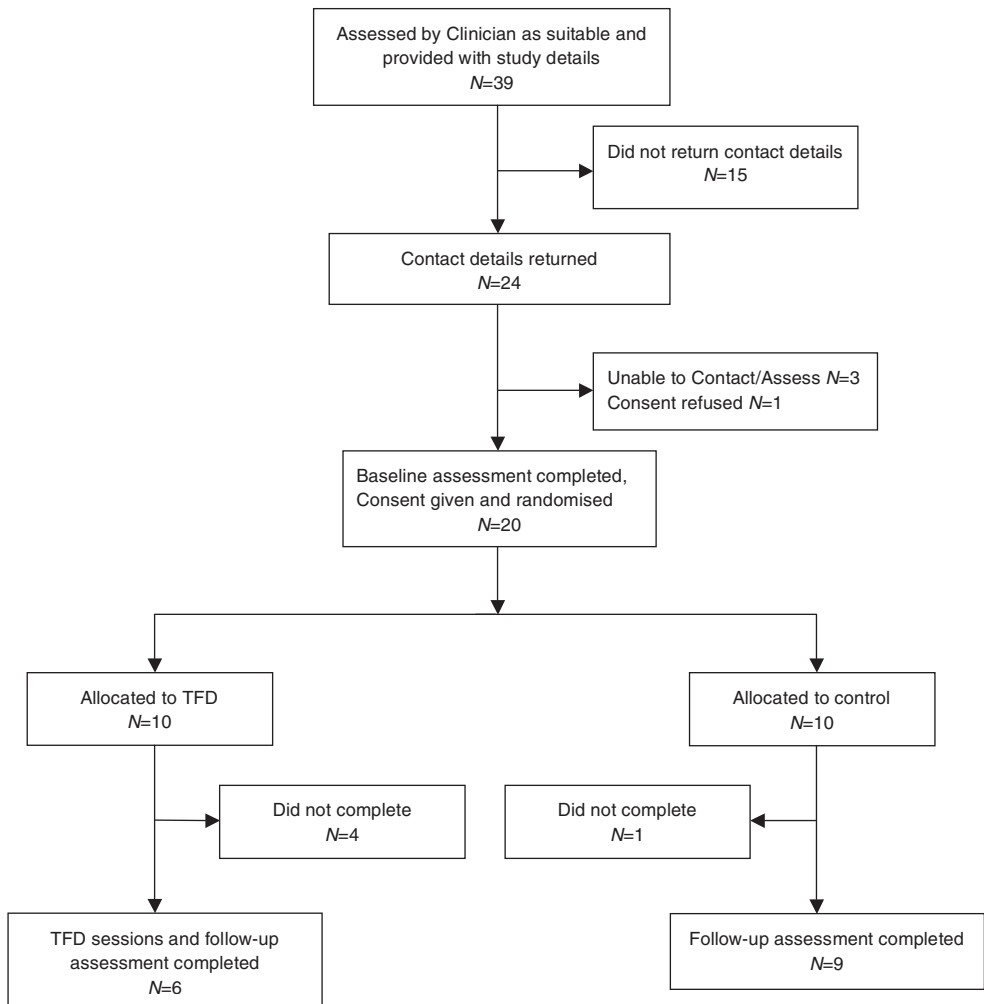


Figure 3. Flow chart of participants in the trial.

most participants would recommend the program to any friend experiencing similar problems. Importantly, despite the considerable variation in the ages of the participants, most found that TFD was on average “just right” in terms of difficulty. Pitching CBT at the right level for young people is vital but complicated (Stallard, 2004), and research with adults suggest that participants often find cCBT too difficult (Andersson et al., 2005). Participants also reported that having someone present to help them use the program was definitely helpful. The effects of professional support and supervision is complicated, with some work with cCBT for children and adolescents finding that improvements can be made with limited or no supervision (Abeles et al., 2009; March et al., 2009; Spence et al., 2006). However other work

Table 2. Changes in standardized measures for control and TFD groups individually

Measure	Waiting list control group	TFD experimental group
SCAS		
Panic attacks	Ns	Ns
Separation anxiety	Ns	Ns
Physical injury	$t(8) = 2.83, p < .05,$	Ns
Social phobia	Ns	$t(8) = 2.08, p < .05$
OCD	Ns	Ns
GAD	Ns	Ns
Total anxiety	Ns	Ns
Self-esteem (RSEL)	$t(8) = -2.16, p < .05$	$t(8) = -2.17, p < .05$
Depression (AWS)	Ns	$t(5) = 2.49, p < .05$
Cognitive schemas (SQC)	$t(8) = 2.30, p < .05$	$t(8) = 2.89, p < .05,$
SDQ (Parent rated)		
Emotional	Ns	$t(5) = 2.08, p < .05$
Hyperactivity	Ns	$t(5) = 2.67, p < .05$
Conduct	Ns	Ns
Pro-social	Ns	Ns
Total	Ns	$t(5) = 2.98, p < .05$

Table 3. Median feedback scores

Item	Median rating
Did you enjoy TFD? (<i>1 not at all – 9 a lot</i>)	7
Did TFD help you to understand your problems? (<i>1 not at all – 9 a lot</i>)	7
Has TFD helped you find ways to cope with your problems? (<i>1 no – 9 a lot</i>)	7
Have you used these new ways to cope with your problems? (<i>1 never – 9 all the time</i>)	6
Would you recommend TFD to a friend? (<i>1 definitely no – 9 definitely yes</i>)	7
How (difficult) did you find TFD? (<i>1 Too difficult, 5 just right, 9 too easy</i>)	5
Was it helpful having someone with you as you used TFD? (<i>1 definitely no – 9 definitely yes</i>)	9

with children and adults suggest that professional support during cCBT enhances outcome (Hicks, Von Baeyer and McGrath, 2006; Spek et al., 2007), and a recent survey of clinicians found that many thought a lack of therapeutic relationship would be a major weakness of cCBT (Stallard, Richardson and Velleman, 2010).

This study suffers from having a small sample size, but the preliminary results are encouraging and suggest that the cCBT programme examined here is an acceptable and clinically effective intervention for depression and anxiety in children and adolescents. Future

research with a larger sample and an extended follow-up period would help better understand the outcomes from this software package.

Disclosure of interests

Paul Stallard holds intellectual property rights for the intervention being studied here (Think, Feel, Do).

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